What is claimed is:

1. A beamsplitter apparatus for use with a high-power radiation beam, comprising:

a thermally conducting frame with a central aperture; and

a window held in the central aperture so as to be able to conduct heat from the window to the frame, wherein the window includes a diamond substrate.

2. The beamsplitter apparatus of claim 1, wherein the window includes a coating formed on the diamond substrate.

3. The beamsplitter apparatus of claim 1, wherein the coating is adapted to reflect a select portion of the high-power radiation beam.

4. The beamsplitter apparatus of claim 1, wherein the frame includes a cooling conduit formed therein, and the apparatus further includes a cooling system operably coupled to the cooling conduit to flow a cooling fluid through the cooling conduit.

5. The beamsplitter apparatus of claim 1, wherein the central aperture and window are elongate.

6. The beamsplitter apparatus of claim 1, wherein the high-power radiation beam has first and second polarization components, and wherein the window includes a coating adapted to reflect the first polarization component and transmit the second polarization component.

7. The beamsplitter apparatus of claim 1, wherein the frame includes:

a retaining groove that runs around the central aperture;

an O-ring retained in the retaining grove; and

wherein the window includes a periphery, and wherein the retaining groove and O-ring operate to press the window to the frame at or near the window periphery.

8. The beamsplitter apparatus of claim 1, wherein the frame is made of

copper.

9. The beamsplitter apparatus of claim 8, wherein the copper frame is coated with a layer of gold.

10. The beamsplitter apparatus of claim 1, wherein the frame comprises first and second frame sections.

11. The beamsplitter apparatus of claim 1, wherein the frame is attached to a base plate.

12. A beamsplitter apparatus, comprising:

a thermally conducting frame having a central aperture;

a window flat surface and a periphery, and comprising a diamond substrate;

a coating formed on the flat surface; and

wherein the window is held in the frame central aperture at or near the window periphery such that heat absorbed by the window from a high-power radiation beam incident thereon is conducted to the frame to prevent the flat window surface from substantially distorting.

13. The beamsplitter apparatus of claim 12, wherein the coating includes one or more films made of a material selected from the group materials comprising: ThF_4, Ge, ZnSe, and BaF_2.

14. The beamsplitter apparatus of claim 12, wherein the frame includes a cooling conduit adapted to flow a cooling fluid therethrough to cool the frame.

15. A method of separating first and second polarization components from a high-power polarized radiation beam, comprising:

directing the high-power radiation beam to a first polarizing beamsplitter comprising a thermally conducting frame and a first window held in thermal contact within the frame, the first window including a first coating formed on a diamond substrate;

reflecting the first polarization component from the first window to form a first polarized radiation beam, and transmitting the second polarization component through

the first window to form a second radiation beam, while the first window absorbs a portion of high-power radiation beam as heat; and

removing the heat from the first window by transmitting the heat to the frame and cooling the frame so that the first window remains substantially undistorted.

16. The method of claim 15, further including directing one of the first and second polarized radiation beams to a second polarizing beamsplitter to enhance the polarization of said one polarized radiation beam.

17. A method. comprising:

directing an incident radiation beam to a window held in thermal contact within a frame, the window including a diamond substrate;

reflecting a portion of the incident radiation beam from the window to form a first radiation beam;

transmitting a portion of the incident radiation beam through the window to form a second radiation beam, while the first window absorbs a portion of the incident radiation beam as heat; and

removing the heat from the window by transmitting the heat to the frame and cooling the frame so that the first window remains substantially undistorted.

18. The method of claim 17, including providing a coating to the window, wherein the coating acts to provide a select amount of reflection and transmission of the incident radiation beam.

19. The method of claim 18, wherein the coating is formed as a polarizing coating.

20. An optical system for irradiating workpiece, comprising:

a radiation source adapted to emit a high-power radiation beam;

a beamsplitter apparatus arranged to receive the high-power radiation beam and form therefrom a transmitted high-power radiation beam, wherein the beamsplitter apparatus includes:

a thermally conducting frame with a central aperture;

a window held in the central aperture so as to be in thermal contact with the frame, wherein the window comprises a diamond substrate ; and

a lens arranged to receive one of the transmitted radiation beam and reflected radiation beam and direct it to the workpiece.

21. The system of claim 20, wherein the high-power radiation beam includes first and second polarization components, and wherein the window includes a beamsplitting coating on the diamond substrate so that the reflected radiation beam includes mostly the first polarization component, and the transmitted radiation beam includes mostly the second polarization component.

22. The system of claim 20, wherein the transmitted radiation is P polarized, and wherein the lens directs the transmitted radiation to the workpiece at an incident angle at or near the Brewster's angle.

23. An optical system for irradiating a first substrate with high-power polarized radiation, comprising:

a radiation source adapted to emit a high-power radiation beam along an optical axis;

a polarizing beamsplitter apparatus arranged downstream of the radiation source along the optical axis and oriented to receive the high-power radiation beam and form therefrom a reflected high-power radiation beam with a select polarization, the polarizing beamsplitter apparatus comprising:

a thermally conducting frame with a central aperture;

a window held in the central aperture so as to be able to conduct heat from the window to the frame; and

wherein the window comprises a diamond substrate and a beamsplitting film formed on the diamond substrate; and

a lens arranged to receive the reflected high-power radiation beam and direct it to the first substrate.